

Notice of Allowability	Application No.	Applicant(s)	
	09/986,818	TAKAGI ET AL.	
	Examiner	Art Unit	
	William H. Wood	2124	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 13 November 2001.
2. ☒ The allowed claim(s) is/are 1-22.
3. ☒ The drawings filed on 13 November 2001 are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|--|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____. |
| 3. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date <u>111301</u> | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____. |

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

The application has been amended as follows, in order to correct miner antecedent basis errors:

Claim 2

An apparatus according to claim 1, further comprising:

(h) a control information template for defining a to-be-modified item (hereinafter called "object item"), which is not a grammar error but should be considered in view of circuit designing, and modification rule to modify said object item;

(i) object item detecting means for detecting a portion corresponding to said object item in the HDL description, based on the result of the syntax analysis by said HDL syntax analysis means; and

(j) object item modifying means for modifying the [last-named] said corresponding portion, which has been detected by said object item detecting means, in accordance with said modification rule defined by said control information template;

said HDL reverse syntax analysis means being operable to perform a reverse syntax analysis of the modified HDL description, which is the description as the result of

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the modification by said semantic grammar error modifying means and said object item modifying means;

said comment attaching means being operable to attach a comment about the modification to the modified corresponding portion, which is the portion as the result of the modification by said semantic grammar error modifying means and said object item modifying means.

Claim 3

An apparatus for automatically modifying circuit design information (hereinafter called the HDL description) described in a hardware description language (HDL), said apparatus comprising:

(a) HDL lexical analysis means for performing a lexical analysis of the HDL description which is to be modified;

(b) HDL syntax analysis means for performing a syntax analysis of the HDL description based on the result of the lexical analysis by said HDL lexical analysis means, to convert the HDL description into a parse tree format description;

(c) a control information template for defining a to-be-modified item (hereinafter called "object item"), which is not a grammar error but should be considered in view of circuit designing, and a modification rule to modify said item;

(d) object item detecting means for detecting a portion corresponding to said object item in the HDL description, based on the result of the syntax analysis by said HDL syntax analysis means;

(e) object item modifying means for modifying the [last-named] said corresponding portion, which has been detected by said object item detecting means, in accordance with said modification rule defined by said control information template;

(f) HDL reverse syntax analysis means for performing reverse syntax analysis of the modified HDL description, which is the description as the result of the modification by said object item modifying means, to convert the HDL description from said parse tree format description into an ordinary description; and

(g) comment attaching means for attaching a comment about the modification to the modified corresponding portion, which is the portion as the result of the modification by said object item modifying means.

Claim 4

An apparatus according to claim 2, wherein said control information template defines:

said object item in such a manner that, on the assumption that the HDL being currently modified is converted into another HDL, said object item detecting means detects a portion of the current HDL description, which portion does not comply with language rules of the second-named HDL, as a portion corresponding to said object item; and

said modification rule in such a manner that said object item modifying means modifies the [last-named] said corresponding portion, which has been detected by said object item detecting means, into a description that complies with the language rules of said second-named HDL.

Claim 5

An apparatus according to claim 3, wherein said control information template defines:

said object item in such a manner that, on the assumption that the HDL being currently modified is converted into another HDL, said object item detecting means detects a portion of the current HDL description, which portion does not comply with language rules of the second-named HDL, as a portion corresponding to said object item; and

said modification rule in such a manner that said object item modifying means modifies the [last-named] said corresponding portion, which has been detected by said object item detecting means, into a description that complies with the language rules of said second-named HDL.

Claim 6

An apparatus according to claim 4, wherein if the current HDL is case-sensitive, in consideration of a possibility that the current HDL might be converted into another HDL that is case-insensitive, said control information template defines:

said object item in such a manner that said object item detecting means detects one of a pair of character strings which are composed of common characters arranged in the same order and described case-sensitively, as a portion corresponding to said object item; and

said modification rule in such a manner that said object item modifying means modifies the [last-named] said corresponding portion, which has been detected by said object item detecting means, by generating a new character string that is not contained in the HDL description, and then replacing said one of the two characters strings, which has been detected by said object item detecting means, with said new character string.

Claim 7

An apparatus according to claim 5, wherein if the current HDL is case-sensitive, in consideration of a possibility that the current HDL might be converted into another HDL that is case-insensitive, said control information template defines:

said object item in such a manner that said object item detecting means detects one of a pair of character strings which are composed of common characters arranged in the same order and described case-sensitively, as a portion corresponding to said object item; and

said modification rule in such a manner that said object item modifying means modifies the [last-named] said corresponding portion, which has been detected by said object item detecting means, by generating a new character string that is not contained in the HDL description, and then replacing said one of the two characters strings, which has been detected by said object item detecting means, with said new character string.

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Claim 8

An apparatus according to claim 4, wherein if the current HDL is case-insensitive, in the consideration of a possibility that the current HDL might be converted into another HDL that is case-sensitive, said control information template defines:

said object item in such a manner that said object item detecting means detects every upper case character or every lower case character in a character string, as a portion corresponding to said object item; and

said modification rule in such a manner that said object item modifying means modifies the [last-named] said corresponding portion, which has been detected by said object item detecting means, by converting every upper case character into a lower case character, or every lower case character into an upper case character.

Claim 9

An apparatus according to claim 5, wherein if the current HDL is case-insensitive, in the consideration of a possibility that the current HDL might be converted into another HDL that is case-sensitive, said control information template defines:

said object item in such a manner that said object item detecting means detects every upper case character or every lower case character in a character string, as a portion corresponding to said object item; and

said modification rule in such a manner that said object item modifying means modifies the [last-named] said corresponding portion, which has been detected by said

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object item detecting means, by converting every upper case character into a lower case character, or every lower case character into an upper case character.

Claim 10

An apparatus according to claim 2, wherein said control information template defines:

said object item in such a manner that said object item detecting means detects a character string which includes a predetermined prohibited character, as a portion corresponding to said object item; and

said modification rule in such a manner that said object item modifying means modifies the [last-named] said corresponding portion, which has been detected by said object item detecting means, by generating a new character string which neither is contained in the HDL description nor includes said predetermined prohibited character, and then replacing the prohibited-character-included character string, which has been detected by said object item detecting means, with said new character string.

Claim 11

An apparatus according to claim 3, wherein said control information template defines:

said object item in such a manner that said object item detecting means detects a character string which includes a predetermined prohibited character, as a portion corresponding to said object item; and

said modification rule in such a manner that said object item modifying means modifies the [last-named] said corresponding portion, which has been detected by said

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object item detecting means, by generating a new character string which neither is contained in the HDL description nor includes said predetermined prohibited character, and then replacing the prohibited-character-included character string, which has been detected by said object item detecting means, with said new character string.

Claim 12

An apparatus according to claim 2, wherein said control information template defines:

said object item in such a manner that said object item detecting means detects a portion of the HDL description, which portion is inconsistent in terminal description between a plurality of hierarchical levels of the HDL description, as a portion corresponding to said object item; and

said modification rule in such a manner that said object item modifying means modifies the inconsistent terminal description in the [last-named] said corresponding portion, which has been detected by said object item detecting means, into a correct description which is consistent between all of the plural hierarchical levels of the HDL description.

Claim 13

An apparatus according to claim 3, wherein said control information template defines:

said object item in such a manner that said object item detecting means detects a portion of the HDL description, which portion is inconsistent in terminal description

between a plurality of hierarchical levels of the HDL description, as a portion corresponding to said object item; and

said modification rule in such a manner that said object item modifying means modifies the inconsistent terminal description in the [last-named] said corresponding portion, which has been detected by said object item detecting means, into a correct description which is consistent between all of the plural hierarchical levels of the HDL description.

Claim 14

An apparatus according to claim 2, wherein said control information template defines:

said object item in such a manner that said object item detecting means detects a portion of the HDL description, which portion yields an incorrect relationship between the left and the right sides of a signal assignment description, as a portion corresponding to said object item; and

said modification rule in such a manner that said object item modifying means modifies the [last-named] said corresponding portion, which has been detected by said object item detecting means, into a correct description which yields a correct relationship between the left and the right sides of said signal assignment description.

Claim 15

An apparatus according to claim 3, wherein said control information template defines:

said object item in such a manner that said object item detecting means detects a portion of the HDL description, which portion yields an incorrect relationship between the left and the right sides of a signal assignment description, as a portion corresponding to said object item; and

said modification rule in such a manner that said object item modifying means modifies the [last-named] said corresponding portion, which has been detected by said object item detecting means, into a correct description which yields a correct relationship between the left and the right sides of said signal assignment description.

Claim 16

An apparatus according to claim 2, wherein said control information template defines:

said object item in such a manner that said object item detecting means detects a portion of the HDL description, which portion is unable to be synthesized by a logic synthesis tool, as a portion corresponding to said object item; and

said modification rule in such a manner that said object item modifying means deletes the [last-named] said corresponding portion, which has been detected by said object item detecting means.

Claim 17

An apparatus according to claim 3, wherein said control information template defines:

said object item in such a manner that said object item detecting means detects a portion of the HDL description, which portion is unable to be synthesized by a logic synthesis tool, as a portion corresponding to said object item; and

said modification rule in such a manner that said object item modifying means deletes the [last-named] said corresponding portion, which has been detected by said object item detecting means.

Claim 18

An apparatus according to claim 2, wherein said control information template defines:

said object item in such a manner that said object item detecting means detects a portion of the HDL description, which portion is unable to be synthesized by a logic synthesis tool, as a portion corresponding to said object item; and

said modification rule in such a manner that said object item modifying means adds to the [last-named] said corresponding portion, which has been detected by said object item detecting means, a directive for instructing said logic synthesis tool to ignore said last-named corresponding portion.

Claim 19

An apparatus according to claim 3, wherein said control information template defines:

said object item in such a manner that said object item detecting means detects a portion of the HDL description, which portion is unable to be synthesized by a logic synthesis tool, as a portion corresponding to said object item; and

said modification rule in such a manner that said object item modifying means adds to the [last-named] said corresponding portion, which has been detected by said object item detecting means, a directive for instructing said logic synthesis tool to ignore said last-named corresponding portion.

Claim 21

A computer-readable recording medium according to claim 20, wherein said program further instructs the computer to function as the following:

(g) object item detecting means for detecting a portion corresponding to a to-be-modified item (hereinafter called "object item") in the HDL description, which item is not a grammar error but should be considered in view of circuit designing, based on the result of the syntax analysis by said HDL syntax analysis means; and

(h) object item modifying means for modifying the [last-named] said corresponding portion, which has been detected by said object item detecting means, in accordance with a modification rule which has been defined previously for said object item;

said HDL reverse syntax analysis means being operable to perform a reverse syntax analysis of the modified HDL description, which is the description as the result of the modification by said semantic grammar error modifying means and said object item modifying means;

said comment attaching means being operable to attach a comment about the modification to the modified corresponding portion, which is the portion as the result of

the modification by said semantic grammar error modifying means and said object item modifying means.

Claim 22

A computer-readable recording medium in which a program for automatically modifying circuit design information (hereinafter called the HDL description) described in a hardware description language (HDL) is recorded, wherein said program instructs a computer to function as the following:

(a) HDL lexical analysis means for performing a lexical analysis of the HDL description which is to be modified;

(b) HDL syntax analysis means for performing a syntax analysis of the HDL description based on the result of the lexical analysis by said HDL lexical analysis means, to convert the HDL description into a parse tree format description;

(c) object item detecting means for detecting a portion corresponding to a to-be-modified item (hereinafter called "object item") in the HDL description, which item is not a grammar error but should be considered in view of circuit designing, based on the result of the syntax analysis by said HDL syntax analysis means;

(d) object item modifying means for modifying the [last-named] said corresponding portion, which has been detected by said object item detecting means, in accordance with a modification rule which has been defined previously for said object item;

(e) HDL reverse syntax analysis means for performing reverse syntax analysis of the modified HDL description, which is the description as the result of the modification by said object item modifying means, to convert the HDL description from said parse tree format description into an ordinary description; and

(f) comment attaching means for attaching a comment about the modification to the modified corresponding portion, which is the portion as the result of the modification by said object item modifying means.

Reasons for Allowance

The following is an examiner's statement of reasons for allowance: the prior art of record fails to teach or suggest the claimed invention. Specifically, the prior art of record fails to teach or suggest comment attaching means for attaching a comment about the modification to the modified portion in combination with semantic error modifying means for modifying the portion in compliance with the conversion function template, HDL reverse syntax analysis means for converting HDL description from said parse tree into an ordinary format (ordinary description as defined on specification page 19, line 25 to page 20, line 3, as a modified HDL description) provided in an apparatus for modifying HDL, comprising HDL lexical analysis, HDL syntax analysis to convert the HDL into a parse tree, semantic grammar error detection means for correcting type mismatch, type conversion template, as recited in independent claims 1 and 20.

Furthermore, the prior art of record fails to teach or suggest comment attaching means for attaching a comment about the modification to the modified portion in combination with object item modifying means for modifying the portion in compliance with the control template, HDL reverse syntax analysis means for converting HDL description from said parse tree into an ordinary format (ordinary description as defined on specification page 19, line 25 to page 20, line 3, as a modified HDL description) provided in an apparatus for modifying HDL, comprising HDL lexical analysis, HDL syntax analysis based on the result of the lexical analysis to convert the HDL into a parse tree, control information template for defining a to-be-modified item "object item" which is not a grammar error but should be considered in view of circuit designing,

object item detecting means for detecting a portion corresponding to said object item, as recited in independent claims 3 and 21.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

The prior art of record, **Ichisugi** (USPN 6,516,461), disclosed conversion of source code into an Abstract Syntax Tree (AST, similar to a parse tree), with a processing step including optimization and translation or conversion into a different language, before generating output source code from the tree (figure 13, column 11, line 66 to column 12, line 17). However, **Ichisugi** failed to disclose individually or suggest via combination with the other prior art of record the claims as recited, including comment attaching means.

The prior art of record, **Skidmore** (USPN 5,488,714), disclosed language conversion means including a comment inserting mechanism describing modifications to code that should be made (column 19, line 43 to column 20, line 5). However, **Skidmore** failed to disclose individually or suggest via combination with the other prior art of record claims as recited, including comment attaching means for attaching a comment about the modification to the modified portion, which is the portion as the result of the modification by said semantic grammar error modifying means.

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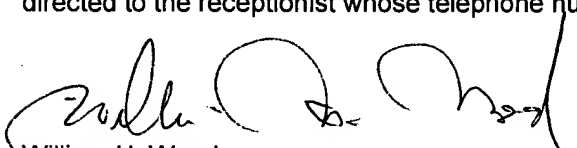
The prior art of record, **Sullivan** (USPN 6,453,464), disclosed templates for conversion of code (column 9, line 57 to column 10, line 6). The prior art of record, **Bass et al.** (USPN 6,591,403), disclosed HDL error detection and automatic conversion/correction. However, **Sullivan** and **Bass** failed to disclose individually or suggest via combination with the other prior art of record the claim limitations as recited.

Correspondence Information


Any inquiry concerning this communication or earlier communications from the examiner should be directed to William H. Wood whose telephone number is (571)-272-3736. The examiner can normally be reached 9:00am - 5:30pm Monday thru Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kakali Chaki can be reached on (571)-272-3719. The fax phone numbers for the organization where this application or proceeding is assigned are (703)872-9306 for regular communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)305-3900.



William H. Wood
March 18, 2005



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